



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,485	10/29/2003	Namwoong Paik	052640-5031-01	5216

9629 7590 08/19/2005

MORGAN LEWIS & BOCKIUS LLP
1111 PENNSYLVANIA AVENUE NW
WASHINGTON, DC 20004

EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 08/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/695,485

Applicant(s)

PAIK ET AL.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/2004</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 is indefinite because "the ionized oxygen gas" lacks antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Shin et al. (U.S. Pat. 6,800,177).

(Please note that Applicant's priority date of 11/21/2002 only relates to the deposition of oxide films; Applicant's current claims relate to the deposition of non-oxide films.)

Regarding claims 1, 9, Shin et al. teach a method for forming a non-oxide film that is carbon. A vacuum chamber is evacuated and maintained at a constant vacuum

Art Unit: 1753

pressure. A work function gas in the form of cesium is introduced onto the sputter target. An inert gas of argon is provided to the chamber. Due to the nature of the sputter process argon inherently ionizes to produce electrons. The non-oxide film is formed on the substrate from the negatively charged ions and neutral particles in the gas, which are also inherent in the sputtering process. (Claim 21)

Regarding claims 2, the film to be produced can be diamond-like-carbon.

(Column 3 lines 63)

Regarding claims 3, the work function reducing agent includes cesium. (Claim 21)

Regarding claims 4, a straight DC voltage can be applied to the target. (Claim 26)

Regarding claims 5, the voltage can be 600 V. (Claim 26)

Regarding claims 7, the temperature of the substrate can be 60, 70 or 80 degrees. (Column 5 lines 55-58)

Regarding claim 9, as discussed above the sputtering process produces ions of argon, which produces electrons, which are kept close to the target due to the charge on the target. (Claim 21, claim 26)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (U.S. Pat. 6,800,177) in view of Kim et al. (WO 02/31215).

Shin et al. is discussed above and all is as applies above. (See Shin et al. discussed above)

The differences between Shin et al. and the present claims are that the use of a magnetron for the target, grounding or biasing the substrate, the temperature of the substrate and the range of pressure utilized.

Kim et al. teach the use of a magnetron for a target when sputtering in Cesium.
(Page 7 line 5)

Kim et al. teach that the substrate may be either grounded or positively biased.
(Page 9 lines 15-16)

Kim et al. teach the temperature of the substrate to be 70 degrees C. (Page 10 line 20)

Kim et al. teach the working pressure of the chamber during sputtering to be around 1×10^{-4} torr. (Page 9 lines 12-13)

The motivation for utilizing a magnetron, grounding or biasing the substrate, controlling the temperature of the substrate and controlling the pressure is that it allows for depositing a film with a particular crystalline growth. (Page 10 lines 12-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Shin et al. by utilizing a magnetron, grounding or biasing the substrate, controlling the temperature of the substrate and controlling the pressure as taught by Kim et al. because it allows for depositing a film with a particular crystalline growth.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (KR 2003-016044) in view of Kim et al. (WO 02/31215).

Lee teaches a metal ion sputtering chamber using Cs to activate the ionization of a thin film material and change ionization energy by using Cs. (See Abstract) A target device includes a target having a thin film material and a target power source as the first power source. A shield portion is located around the target. Cesium is supplied to the shield portion in order to activate the thin film material. A shield power is applied to control the bias of the shield portion. A cesium reservoir is used for supplying the cesium. The cesium is heated with the cesium reservoir. The vaporized cesium is provide to an upper portion of the target. A liquid source is prepared within the target. A mesh device is formed with a mesh grid and a mesh bias. A grid supporter is used for supporting the mesh grid. A substrate supporter is used for supporting a substrate. A

Art Unit: 1753

substrate power source is connected with the substrate supporter. A load lock and a vacuum pump are located at a side portion of the chamber. (See Abstract) Since metal is being deposited it is presumed to encompass the metals listed in Applicant's claims. The power source can be RF to the target.

The differences between Lee and the present claims is the admission of argon into the chamber for sputtering, the applied voltage to the target is not discussed, the biasing or grounding of the substrate is not discussed, the temperature of the substrate is not discussed, the pressure in the process chamber is not discussed, utilizing a magnetron is not discussed.

Kim et al. teach utilizing argon in addition to cesium when sputtering. (Page 6 line 6)

Kim et al. teach applying 25 to 1000 volts to the target. (Page 9 lines 14-15)

Kim et al. teach that the substrate may be either grounded or positively biased. (Page 9 lines 15-16)

Kim et al. teach the temperature of the substrate to be 70 degrees C. (Page 10 line 20)

Kim et al. teach the working pressure of the chamber during sputtering to be around 1×10^{-4} torr. (Page 9 lines 12-13)

Kim et al. teach the use of a magnetron for a target when sputtering in Cesium. (Page 7 line 5)

The motivation for admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular

Art Unit: 1753

temperature of the substrate, utilizing a particular pressure in the process chamber, and utilizing a magnetron is that it allows for depositing a film with a particular crystalline growth. (Page 10 lines 12-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Lee by admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular temperature of the substrate, utilizing a particular pressure in the process chamber, and utilizing a magnetron as taught by Kim et al. because it allows for depositing a film with a particular crystalline growth.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. PG PUB 2004/0045810) in view of Kim et al. (WO 02/31215).

Kim teaches a sputter deposition process in which a cesium vapor is directed to the surface of the target. (See Abstract; Claims 16, 17)

The differences between Kim and the present claims is the admission of argon into the chamber for sputtering, the applied voltage to the target is not discussed, the biasing or grounding of the substrate is not discussed, the temperature of the substrate is not discussed and the pressure in the process chamber is not discussed.

Kim et al. teach utilizing argon in addition to cesium when sputtering. (Page 6 line 6)

Kim et al. teach applying 25 to 1000 volts to the target. (Page 9 lines 14-15)

Kim et al. teach that the substrate may be either grounded or positively biased. (Page 9 lines 15-16)

Kim et al. teach the temperature of the substrate to be 70 degrees C. (Page 10 line 20)

Kim et al. teach the working pressure of the chamber during sputtering to be around 1×10^{-4} torr. (Page 9 lines 12-13)

The motivation for admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular temperature of the substrate and utilizing a particular pressure in the process chamber is that it allows for depositing a film with a particular crystalline growth. (Page 10 lines 12-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim by admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular temperature of the substrate and utilizing a particular pressure in the process chamber as taught by Kim et al. because it allows for depositing a film with a particular crystalline growth.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Art Unit: 1753

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5, 7 and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21-26 of U.S. Patent No. 6,800,177. Although the conflicting claims are not identical, they are not patentably distinct from each other because U.S. Pat. 6,800,177 as discussed above teach the same process for producing a carbon film.

The difference between the current claims and U.S. Pat. 6,800,177 is that the claims require depositing all non-oxide films.

Carbon is a non-oxide film and reads on the claims.

Claims 1-17 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21-26 of U.S. Patent No. 6,800,177 in view of Kim et al. (WO 02/31215).

The differences not yet discussed are the use of a magnetron for the target, grounding or biasing the substrate, the temperature of the substrate and the range of pressure utilized.

Kim et al. teach the use of a magnetron for a target when sputtering in Cesium.
(Page 7 line 5)

Kim et al. teach that the substrate may be either grounded or positively biased.
(Page 9 lines 15-16)

Kim et al. teach the temperature of the substrate to be 70 degrees C. (Page 10 line 20)

Art Unit: 1753

Kim et al. teach the working pressure of the chamber during sputtering to be around 1×10^{-4} torr. (Page 9 lines 12-13)

The motivation for utilizing a magnetron, grounding or biasing the substrate, controlling the temperature of the substrate and controlling the pressure is that it allows for depositing a film with a particular crystalline growth. (Page 10 lines 12-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified U.S. Pat. 6,800,177 by utilizing a magnetron, grounding or biasing the substrate, controlling the temperature of the substrate and controlling the pressure as taught by Kim et al. because it allows for depositing a film with a particular crystalline growth.

Claims 1-17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 16 and 17 of copending Application No. 10/234,105 in view of Kim et al. (WO 02/31215).

Application 10/234,105 teach a sputter deposition process in which a cesium vapor is directed to the surface of the target. (See Claims 16, 17)

The differences between Application 10/234,105 and the present claims is the admission of argon into the chamber for sputtering, the applied voltage to the target is not discussed, the biasing or grounding of the substrate is not discussed, the temperature of the substrate is not discussed and the pressure in the process chamber is not discussed.

Kim et al. teach utilizing argon in addition to cesium when sputtering. (Page 6 line 6)

Art Unit: 1753

Kim et al. teach applying 25 to 1000 volts to the target. (Page 9 lines 14-15)

Kim et al. teach that the substrate may be either grounded or positively biased.

(Page 9 lines 15-16)

Kim et al. teach the temperature of the substrate to be 70 degrees C. (Page 10 line 20)

Kim et al. teach the working pressure of the chamber during sputtering to be around 1×10^{-4} torr. (Page 9 lines 12-13)

The motivation for admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular temperature of the substrate and utilizing a particular pressure in the process chamber is that it allows for depositing a film with a particular crystalline growth. (Page 10 lines 12-15)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Application 10/234,105 by admitting argon into the chamber for sputtering, applying voltage to the target, biasing or grounding of the substrate, utilizing a particular temperature of the substrate and utilizing a particular pressure in the process chamber as taught by Kim et al. because it allows for depositing a film with a particular crystalline growth.

This is a provisional obviousness-type double patenting rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
7-27-05